

## PHYSICAL ANTHROPOLOGY.



## THE ANTHROPOLOGY OF THE NORTH AMERICAN INDIAN.

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OUR knowledge of the anthropology of North America is based mainly upon the discussion of a number of important anthropological collections. First among these must be mentioned the famous Morton collection now in the possession of the Academy of Natural Sciences in Philadelphia, which forms the basis of Morton and Meigs' famous investigations. A large collection relating particularly to prehistoric American peoples has grown up in Cambridge, Mass., and the reports of the Peabody Museum contain much valuable material on our subject. Perhaps the largest collection is that of the U. S. Army Medical Museum in Washington, a published catalogue of which has made accessible a vast amount of anthropological material. But all of these data taken together have not been sufficient to delineate in a satisfactory manner the distribution of types of man in North America.

Investigations on osteological material, particularly on material collected among modern tribes, are always unsatisfactory, in that the identification of the skull, regarding its tribe and sex, often remains doubtful. Neither is it certain if we have to deal with the remains of full-blood Indians or with those of half-breeds. It appears, therefore, that for a more thorough investigation of the anthropology of North American Indians an investigation on living individuals is indispensable.

When the plans for the Department of Ethnology of the World's Columbian Exposition were being formed, Professor Putnam decided to include an investigation of the physical characteristics of the North American Indians in his work, and entrusted me with its organization. A number of young men, principally college students interested in this work, were instructed in the method of taking the observations. The material obtained through their agency has been the basis of the exhibit on the physical characteristics of the North American Indian. The material consists of measurements of about 17,000 full-blood and



half-breed Indians which are distributed all over the North American continent with the exception of the Arctic coast and the Mackenzie Basin.

Before I begin to describe the results of this extensive inquiry I may be permitted to dwell briefly upon the leading considerations of the investigations.

The present generation of Indians is mixed to a considerable extent with whites and negroes, so much so that in certain regions it is impossible to find a full-blood individual. Thus the numerous tribes of the Iroquois, Cherokees, Chickasaws and Choctaws contain very few full-blood individuals, if any. Tribes which were once numerous and which inhabited the coast of the Atlantic Ocean have entirely disappeared, or an insignificant rest only survives. It appeared practically impossible to secure adequate data for the whole region embracing New England, the Middle States and the Southern States. On the other hand the great frequency of half-breeds among all these tribes made an investigation on these races very interesting. I decided, therefore, to pay particular attention to the question regarding the anthropology of the half-breeds. In fact, this has proved to be one of the most fruitful fields of the investigation.

In studying the characteristics of various Indian tribes as found by our observers, the question arises how to arrange them. On general principles it seemed best to consider the tribes simply as geographical groups and to treat the results also from a geographical standpoint. Following this principle, a number of tribes have been subdivided according to their present location. Thus the Ojibway, who inhabit a large part of Canada, are divided into an eastern and a western section. On the other hand groups of small tribes which inhabit the same region, and which show no differences in type, have been combined.

In order to define more clearly what is meant by a certain type, I will say that I consider the types as merely representing a series of forms found in a certain district. For convenience sake the names of the tribes among whom these types have been collected have been adopted for designating the types. I do not mean to say that the types which have been established are considered as original types of the respective peoples. The people itself may have become mixed in the course of the centuries with numerous other peoples, so much so that its original type may have disappeared entirely. There is no necessary correlation between the social unit which we call a tribe and the physical unit which constitutes the characteristics of the individuals



of a certain region. The physical type is the result of the complex descent of a people and of the effect of the surroundings upon its physical development. It has nothing to do with the political and social organizations which we call tribes or nations. Therefore, if in the following I speak of types of the Sioux, or of Californians, it must be understood that I do not mean the types of the primitive Sioux tribe or the primitive tribes of California, but rather that I mean simply the types of the people inhabiting at present the regions occupied by the Sioux or by the Californian tribes.

It was necessary to confine the series of measurements to the most important ones, and particularly to avoid the necessity of the removal of clothing. Only by this restriction could a sufficient number of measurements be secured. It has been my endeavor to establish differences of types only in such cases where the number of cases was sufficient to show that the differences were real, not accidental. In tracing such differences it was particularly necessary to correct errors and inaccuracies of observation. In order to remedy this I have endeavored to obtain two independent series of observations on each tribe, taken by different observers and at different times. Whenever there was a reason to doubt the accuracy of an observer his returns have been excluded.

I turn now to consider the results obtained by our investigations. It is a well-known fact that the number of Indians is decreasing. This is partly due to the fact that mixed-bloods leave the tribes, but partly also to the actual reduction in numbers. It seemed of importance to know if this fact is due to the small number of births or to other causes, and also to compare the increase among half-breeds with that among full-blood Indians. For this purpose statistics have been collected regarding the number of children of Indian and half-breed women. It appears from these statistics that Indian women of more than forty years have on an average, approximately, six children, while half-breed women have on an average from seven to eight children. When the frequency of cases of women who have no children, or only two, three, four, five children, etc., are plotted, it appears that the smaller numbers of children are very much more frequent among the Indians than among the half-breeds, while the higher numbers of children are much more frequent among the half-breeds than among the Indians; that is to say, we find the rather unexpected result that the fertility among half-breed women is considerably larger than among full-blood women. The average number of children of Indian women

is also high, and therefore the decrease in their numbers can only be explained by the fact that there exists a very high infant mortality.

In comparing the measurements of the head and of the face of Indians with those of whites we find the most striking difference to be in the dimensions of the transversal diameters of the face. On an average the breadth of face of the Indian is one centimetre more than that of the American white. It may be remarked that the face of the latter is exceedingly narrow and that in Europe, particularly in its eastern portions, we find faces which are considerably wider.

It is of interest to investigate the breadth of face of the half-breed in order to see if it stands between the measurements of the parental races, and if it is nearer the one than the other. For this purpose I have computed the breadth of face of children of full-blood Indians, half-breeds and whites from year to year, beginning with the fourth year. The tabulation shows that the difference which was noted between the adults exists just as markedly among children. The faces grow in such a way that the relation of the three groups always remains the same. The breadth of face of half-breeds stands always between that of the Indians and that of the whites, but so that it is always nearer the former. This is the case among boys as well as among girls. Thus we find the remarkable fact that at least in this one respect the half-breed is always more alike to the Indian than to the whites.

When we consider the color and structure of the hair the same fact becomes clear: light hair is of very rare occurrence among half-breeds; they have almost always the peculiar dark and coarse Indian hair; the colors of the eyes show also the same phenomenon. Therefore we may safely say that the half-breed resembles his Indian parent more than his white parent. Two reasons may be assigned for this fact. It may be that the dark hair and the wide face are more primitive characteristics of man than the narrow face and light eyes of the whites. Then we might say that the characteristics of the Indian are inherited with greater strength because they are older. It must, however, also be considered that half-breeds are almost always descendants of Indian mothers and white fathers, and this may have had an influence, although there is no proof that children resemble their mothers more than their fathers. There is another peculiarity of the measurements of full-bloods and half-breeds which is worth remarking. If we count all the individuals who have a certain breadth of face, say 140, 141, 142 millimetres, etc., it is found



that the measurement of 148 millimetres, which is approximately the average measurement, is the one which is most frequent. Among Indians it occurs 16 times among each 100 individuals. Among whites the most frequent measurement for the breadth of face is 138 millimetres, which also occurs about 16 times among each 100 individuals. The average measurement of the half-breeds is about 144 millimetres. This, however, occurs only about 10 times among each 100 individuals. If, on the other hand, we compare the frequency of occurrence of excessively wide faces and excessively narrow faces as compared to the average of each group, we see that they are more frequent among the mixed races than among the pure races. It appears, therefore, that the half-breeds differ among themselves more than do the pure races. But still another phenomenon is of importance. While the average measurement of 144 millimetres occurs only 10 times among each 100 individuals, those of 140 millimetres and 146 millimetres occur each 12 times among each 100 individuals. Thus it appears that the middle form is not as frequent as forms similar to those of the parental races. It may seem that the difference of frequency mentioned here is not very great. It appears, however, that this irregularity occurs in all tabulations of measurements of half-breeds: therefore, it must have some significance. I will call to mind here that the same conclusion has been drawn by Francis Galton from his investigations on heredity; that Dr. von Luschan has also arrived at the same conclusion when considering the forms of skulls of Asia Minor; and that finally the anthropometric investigations on the soldiers enlisted in Baden have given the same results. We may therefore say with a high degree of probability that in the human race the effect of intermixture is not to produce a middle type, but that there is a tendency to reproduce ancestral traits. I shall revert to this matter later on.

The study of the stature of half-breeds reveals biological laws of an entirely different character. The white element which enters into the composition of the half-breeds is very largely of French descent. As the American French are not a very tall race, we may safely say that the white element entering into the composition of the half-breeds is not very tall. Statistics of the stature of Indians show that they may conveniently be classified in three groups: Tall tribes, measuring more than 170 cm.; tribes of middle stature, measuring from 166 to 170 cm., and short tribes, measuring less than 166 cm. When we compare the statures of the tall tribes singly or collectively

with those of the half-breeds of the same tribes we find that the latter are always taller than the full-blood Indians. This fact and the increased fertility among half-breed women would tend to show that the mixture of races results in an increased vitality. The difference in favor of the half-breed is so striking that no doubt can be entertained as to its actual existence. I believe the cause of this fact must be considered to be wholly in the effects of intermixture, as the social surroundings of the half-breeds and of the Indians are so much alike that they cannot cause the existing differences.

It is not surprising that the average stature of half-breeds belonging to the tribes of middle stature is still more in excess of that of the pure bloods, as in this case the average stature of the white race is probably greater than that of the Indians. The difference is finally still more sharply marked among the shortest tribes of Indians.

Very peculiar conditions are revealed by the comparison of the laws of growth of full-blood and half-breed children. We have seen that the adult full-blood is shorter than the adult half-breed. Curiously enough the reverse is the case among children. Until the tenth year of boys and until the ninth year of girls the full-blood child is taller than the half-breed child, while beginning at this period the full-blood child lags behind. Thus it is shown that the rate of growth among the half-breeds is throughout greater than among the Indians. It would be interesting to carry out this comparison and to include the whites, but the social conditions of the latter are so different that the comparison cannot be made advantageously. The phenomenon that the half-breed children are shorter than the Indian children of the same age is found not only among the tall tribes, but also among those of middle stature. I am unable to say if it also exists among tribes of shortest stature, as I have not a sufficient number of half-breed children from tribes of the shortest stature at my disposal. The comparison of rate of growth of boys and girls of the same ages is also instructive. It is a well-known fact that for about three years, from the twelfth to the fourteenth year, white girls are taller than white boys. This period of superiority of growth of the former is marked very indistinctly among the North American Indians. It is a little more clearly defined among half-breeds, but not as distinct as among whites.

The results regarding the growth of Indians are not quite satisfactory on account of the difficulty of obtaining information regarding the exact ages of Indian children. Only in comparatively few cases is the actual age of an Indian child known. In most cases it is



estimated more or less accurately by the observer and by the help of persons who are acquainted with the Indian families. As this is true of both Indians and half-breeds the same conditions affect both series and make the results of the investigations comparable. One point, however, must be borne in mind. The individuals composing the young classes are not comparable to the individuals composing the older classes, because in the former there are many who die before reaching the age represented by the latter class. We do not know if the measurements of the body are not in some way connected with the probability of death before a certain age. This objection holds good of the results of all investigations referring to growth which are obtained according to what Hertel calls the general method.

I turn to the discussion of the distribution of stature in North America. On the whole, the North American Indians may be called a tall people. In studying the distribution of statures several difficulties are encountered. The tribes have changed their mode of life and their residence often. It is well known that stature depends to a great extent upon surroundings. Therefore the stature which we observe at present cannot be transferred, as it were, to the region inhabited by the tribe under consideration even a short time ago. One of the most striking examples is furnished by the Cherokees. As well known, the bulk of this people was transferred to Indian Territory a number of years ago, while a certain number remained among the mountains of North Carolina. At present the stature of the latter people is decidedly shorter than that of the Cherokee of the plains. Here we may have a good example of the effect of surroundings, but it may also be that the greater admixture of foreign blood among the people of the plains had the effect of raising their average stature. The same may be said of the Iroquois, Choctaws and Creeks, who are among the tallest tribes of North America. Looking at the continent as a whole, the tallest statures may be said to be found on the plains. The mountainous regions of the Southeast and of the West contain the people of the shortest stature. The whole Mississippi Valley is taken up by a very tall people. When we proceed further northward towards North Manitoba and the Saskatchewan, the statures become shorter. Great differences in size are also found north and south of the St. Lawrence River, the Montagnais on the north side being very much shorter than the Micmacs on the south side. The Athapascan tribes of New Mexico are of middle stature only. Scattered among them we find the extremely short Pueblos. The Shoshone, Sahaptin and Salish tribes, of the Rocky

Mountains, are of middle stature. As we approach the Pacific coast the distribution of statures becomes more irregular. The most remarkable facts in this region are the increase of exceedingly short statures on the coast of Southern British Columbia, on Puget Sound, in Oregon and in Northern California. With the exception of the Eastern Eskimo these people are decidedly the shortest among all the North Americans. It is very instructive to notice that among these tribes of short statures taller people extend along Columbia River to the Pacific Ocean. As the mode of life of these people is identical, we must consider them the descendants of a taller people.

The distribution of statures in Northern California does not depend alone upon more or less favorable conditions. Thus the considerable difference between the tribes of Hoopa Valley and of Round Valley can hardly be explained by any other means than by assuming that the taller stature of the Hoopa is inherited. From a consideration of the distribution of statures in North America I turn to a discussion of the distribution of head forms. The principal proportion that has been considered in this connection is that between length and breadth of head, generally called the cephalic index. The study of the distribution of the cephalic index in North America is made exceedingly difficult by the prevailing custom of using hard cradle boards. This has the effect of flattening the occiput and thus produces short heads where without the use of the hard cradle board long heads would be found. Besides this the tissues covering the occiput are so extremely thick among the Indians that it is very difficult to discover a moderate degree of flattening. The apparent frequency of short heads among the Winnebagos, Osages and Apaches is entirely due to artificial, although unintentional flattening. The comparison of head forms must therefore be restricted to regions where no deformation is found.

The whole Mississippi Valley is inhabited by people whose cephalic index is approximately 79, that is to say, a mesocephalic people nearly approaching brachycephalism. Around the Great Lakes an increase in this index is found which disappears again further east. The Eastern Arctic coast is characterized by the prevalence of the long heads of the Eskimo. On the North Pacific coast and in isolated spots along the coast we find exceedingly short-headed types, mainly represented by members of the Athapaskan stock and extending down the Rio Grande to the Gulf of Mexico. Scattered between these we find another long-headed type, which seems to be most frequent in Southern California, extending northward to the boundary of Oregon and



probably occupying the Sonora and the pueblos of Queres and Santa Clara. It is not possible to consider these four types as closely related. Each of them is well characterized, and there seems no possibility of combining them with any of the other types. The best known among these types is that of the Eastern Eskimo. Besides the great length of head, they are remarkable for the great height of head and wide face combined with an exceedingly narrow nose. The Indian of the Mississippi Valley is characterized by a large head, mesocephalic, with long occiput, wide and large face and wide nose. His color is light and assumes the so-called copper hue only after exposure to the sun and air. The brachycephalic type of the Pacific coast is at the same time short of stature, of light skin, with an enormously wide face and narrow nose, which is remarkably flat for an Indian nose. The Californian type is best known through a series of skulls from the Southern Californian islands. It is rather low, with narrow nose and moderately wide face.

The distribution of cephalic indices among a few tribes deserves particular mention. The Micmacs of Nova Scotia show the peculiarity that very low indices occur much more frequently among them than among any other Indian tribe of the eastern part of North America. When we compare the distribution of indices among ancient skulls from New England with the series of the Micmacs, it becomes clear that both series are very much alike. As I stated before, indices as low as these are not found anywhere else except on the Arctic coast. I consider this conclusive evidence of an intermixture with Eskimo blood. It is well known that archæological facts tend to indicate that the Eskimo must have lived along the coast of New England at one time. It is therefore of interest to note that this conclusion is borne out by anthropological evidence. If we grant this point, the irregularity of distribution of the cephalic indices among the Micmacs may also be considered as an argument in favor of the theory advanced above, that the intermixture of tribes does not produce a middle type.

Another series of peculiar interest is that of the Ojibway and of the Menominee. In comparing the variability of the cephalic index of the various tribes from the Rocky Mountains eastward to the Great Lakes, we notice that there is a constant increase from west eastward. This means that among the western tribes most individuals are similar to the average individual, while among the eastern tribes the differences among individuals composing the same tribe are greater. When plot-

ting the cephalic indices of the Eastern Ojibways we find that the same index which is found farther west, namely 79, is the one most frequent, and that the index of 83 is also very frequent, while those indices lying between 79 and 83 are not as frequent. This peculiar fact exists in the series for men, women, boys and girls; therefore, there can be no doubt but that there must be some cause for it. By investigating more closely the distribution of indices among the Western Ojibway, it may be noticed that the index of 83 is still more frequent than it would be if the distribution followed the laws of chance. For this reason I conclude that there must have been among these tribes an intermixture of another tribe having an index of 83. It is difficult to decide who these people may have been, but it is certain that they must have been located around the Great Lakes. An investigation of the prehistoric skulls from this region shows that the index of 83 was very frequent at that time, so that we may be justified in the conclusion that we find here the surviving members of the prehistoric population of the region scattered among the present Indians.

I will call attention here to the peculiar fact, that in several series of measurements of the cephalic index we find two maxima of frequency and a minimum of frequency between the two maxima. As the series at our disposal do not exceed two or three hundred, except in a very few cases, these minima of frequency might be considered accidental. They occur, however, at the same point in the series of women, boys and girls. Therefore, we must conclude that their occurrence is not due to the limited number of observations, but to some actual reason. As mentioned before, this minimum is found markedly in the distribution of the cephalic index of the Eastern Ojibway. It is just as strongly emphasized among the Sioux; but in this case the curve of the men differs considerably from that of women, boys and girls, there being only one maximum in the first curve. We find only a certain irregularity indicating that there are more individuals corresponding to the secondary maximum among women and children than would be expected in a probability curve. I consider these irregularities of the curves of considerable importance, as they show conclusively that anthropometric curves are not always probability curves. This is a matter of great theoretical importance, and must be considered in the statistical investigations of the characteristics of certain races. Wherever we find curves which show two maxima or which are not probability curves, we have no



right to consider the average as a type representing the people under consideration. In all such cases, a detailed discussion of their distribution is necessary to obtain satisfactory results. In order to give an instance: It is easily seen that if the biological law which I mentioned several times before in the present remarks is correct, — namely, that the offspring of a mixed race has a tendency to revert to the parental types and not to form middle types — then we must expect that in a mixed race, the composing elements of which show great differences, maxima of frequency of two certain forms must be found which resemble the forms of the ancestors and that one minimum is found representing the mixed form. If then we should interpret the observations in such a way as to say that the average is the typical form of this series we should draw a wrong inference. The average in such a case would have no meaning whatever, while the two maxima would indicate the types composing the mixed race.

If the two parental types do not differ very much, we should not find a distribution of forms showing two maxima, but the intermixture would have the result of producing a more variable race. We might, therefore, expect to find increased variability whenever two distinct types come into contact. There are several good examples of this kind. The Kootenay of the Rocky Mountains, who have intermarried with the Salish of British Columbia and Montana and with the Blackfeet of the Plains, are among the most variable of the North American tribes. I believe the cause of this phenomenon must be looked for in the fact that the Blackfeet are longheaded while the Salish are decidedly shortheaded. The Bella Coola of British Columbia occupy a similar position between the rather longheaded tribes of the coast and the shortheaded tribes of the interior. In this case, also, the effect is an increased variability. The same may be said of the tribes on the coast of Oregon.

The distribution of types upon the Pacific coast deserves particular discussion. Beginning at the Arctic coast we find the longheaded Eskimo. The difference between this group of Eskimo and those of Eastern Arctic America is very remarkable. Their heads are decidedly shorter. As they adjoin all along the coast shortheaded people, it seems that the decrease of their cephalic index is due to the intermixture of Indian blood. While on the eastern coast of America we find the characteristics of the Eskimo type to extend to a considerable distance southward, on the Pacific coast this type ends apparently near the peninsula of Alaska. The Aleutians, although speaking a language

allied to the Eskimo, represent an exceedingly shortheaded type. This is true of the prehistoric skulls as well as of recent ones. Continuing down the coast, we find the Tlingit of Southeastern Alaska, who represent the same shortheaded type, which is evidently identical with the Athapascan type of the interior. At the southern boundary of Alaska the type suddenly changes, and we find a much shorter race, characterized by longer heads, exceedingly wide faces and narrow, high noses. This type embraces all the coast tribes of British Columbia as far south as the central portion of Vancouver Island, with the sole exception of Bella Coola, which we mentioned before. In the southern portion of Vancouver Island there is another sudden change of type. Here we find one of the shortest races of North America, which is characterized by the most excessive brachycephalism, very low faces and flat noses. I have not been able to find any type which resembles it anywhere else in North America. The peculiarities of this type extend southward beyond the Columbia River, but at the same time the type represented by the Bella Coola and Tlingit re-appears and occupies the greater part of the coast as far south as Northern California. At this place we find another sudden change of type, brachycephalism changes again to dolichocephalism, the stature decreases, and the faces become narrower. I am rather inclined to believe that the type of the coast of British Columbia is closely related to this longheaded California type. This belief is based principally upon the similarity in the formation of the face. Unfortunately I have no material at my disposal from Nevada and California which would serve to carry on this sketch of the distribution of types on the Pacific coast, but what I have said will be sufficient to show how many problems remain to be solved in this region.

It would be an interesting problem to compare the distribution of types among prehistoric American races with those found among the living Indians. For this purpose the measurement of skulls of a number of collections have been tabulated, but the results of these investigations are very unsatisfactory, as in prehistoric times the custom of using the hard cradle board and the custom of artificial deformation was more extensive than at present. An attempt has been made to distinguish among the prehistoric skulls from Tennessee those which have been deformed and those which have almost their natural shape. The result shows that the least deformed skulls have a very much lower cephalic index than the general average, and I presume that if the exclusion of deformed skulls were carried out



rigidly we should find this prehistoric people approximately to have the same index as the present population of the Mississippi Valley. On account of the great deformations the prehistoric skulls have a variability—that is, differences among themselves, which are in excess of anything that is observed at the present time.

I have not been able to glean any important conclusions from the measurement of the face except the one fact, that the facial index becomes lower on the Pacific coast.

I hope the brief presentation of the results of our studies will show that Physical Anthropology offers a promising field of study, and that another of the important biological questions which await an answer—The History of the American Race—will appear in a new light when all the physical characteristics of the various types are taken into consideration.







